REMARKS

Initially, Applicants gratefully acknowledge the withdrawal of the prior rejections based on U.S. Patent No. 6,864,641 (Dygert) in combination with various other references, as indicated in the final Office Action of November 2, 2007. However, the claims presently stand rejected under 35 U.S.C. §§ 102 and/or 103 as allegedly anticipated by or unpatentable over newly cited U.S. Patent 6,791,283 (Bowman et al), by itself or in combination with two other patents.

Applicants have carefully studied the Office Action of December 14, 2007 and offer the following remarks in response thereto.

Claim Rejections Under 35 U.S.C. §§ 102 and 103

Claims 1, 6, 10 and 31 presently stand rejected under 35 U.S.C. §102(e) as allegedly anticipated by U.S. Patent 6,791,283 (Bowman et al). Claims 2-5, 7-9, 11-30 and 32-40 presently stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Bowman '283 in view of U.S. Patents 5,661,645 (Hochstein) and 6,305,818 (Lebens et al.). Without acquiescence in the grounds of the rejection, and without prejudice to pursue the original claimed subject matter at a later time by continuation application or otherwise, Applicants have amended some of the claims herein, including all of the independent claims (except claim 1), to clarify the subject matter being claimed. These rejections are respectfully traversed.

1. The Independent Claims (1, 6, 10 and 31)

Each of independent claims 1, 6, 10, and 31 includes various features that sharply distinguish them from Bowman '283.

a. Claim 1

Claim 1 pertains to a battery operated LED lighting apparatus comprising, among other things, a "power supply including a boost regulating circuit," a "constant voltage" being "continuously supplied" to at least one LED, wherein the power supply "maintains the constant voltage by monitoring voltage across the at least one LED."

Bowman '283 discloses a circuit for an LED-based flashlight which operates in a distinctly different way from the device claim 1. Bowman's device operates in two modes. In the first mode, the battery output voltage is allowed to decay. In the second mode, which only occurs when the battery voltage has decayed significantly, the battery output voltage is held at a fixed level (e.g., 1.8 volts for a 3-volt battery). In neither mode, however, does Bowman '283 "maintain[] the constant voltage ***by monitoring voltage across the at least one LED***." Rather, Bowman '283 monitors the local battery voltage to maintain the battery voltage output level, ***regardless of*** the voltage level ***across the LED(s)***. (See Bowman, Fig. 2, "Battery Voltage Feedback") Indeed, the Office Action fails to specify how or where Bowman '283 monitors voltage across the LEDs as required. As this feature is clearly lacking in Bowman '283, it is respectfully submitted that Bowman '283 does not anticipate claim 1 (nor render it obvious).

b. Claim 6

Claim 6 pertains to a battery-operated LED lighting apparatus comprising, among other things, a power supply "including a boost regulating circuit, said power supply in communication with said battery to produce an output voltage to said at

least one light emitting diode such that a constant direct current is continuously supplied at a fixed level to said at least one light emitting diode as said battery discharges regardless of voltage fluctuations across said at least one light emitting diode, wherein over at least a portion of said discharge cycle said output voltage is higher than said battery voltage, and wherein the power supply maintains the constant direct current by sensing electrical current directed through the at least one LED."

Again, it is necessary to consider both operating modes of Bowman '283. Looking at Bowman's second operating mode first, in that second operating mode the battery output voltage is held at a fixed level (e.g., 1.8 volts for a 3-volt battery) while the LED current is allowed to fluctuate, so that the battery "will supply whatever current it can without falling below this voltage." See Bowman '283, col. 5, line 64 – col. 6, line 3. Clearly, Bowman's second operating mode does not result in a "***constant direct current*** ... continuously supplied at a fixed level to said at least one light emitting diode" as required by claim 6.

Bowman's first operating mode, when carefully scrutinized, is also quite different from the operation of the device described in claim 6. While the Office Action cites to Figure 2 of Bowman '283, the accompanying text mentions that Figure 2 is merely a simplified block diagram intended to illustrate the main components of the more detailed circuitry 100 of Figure 1. In the description of Figure 1 at column 5, lines 34 et seq., Bowman '283 describes the circuitry used to provide LED current regulation, namely R3, R4, and R6. A current sense voltage is developed across resistor R3. Resistors R4 and R6 provide a voltage divider in

conjunction with R3. The combination of resistors varies the current in response to changes in the forward voltage of the LED to approximately regulate output ***power*** (P=VI), ***not current***. Bowman '283 explains this operation as follows:

> "Resistors R6 and R4 form a voltage divider which ***adds*** to the voltage at R3 ***a voltage proportional to the converter output voltage***. ... The action of voltage divider R6, R4 is important for two purposes. One is to reduce the voltage across sense resistor R3 in order to improve the overall circuit power conversion efficiency. The other purpose is to compensate for part-to-part variations in the forward voltage of the LEDs. By making the feedback signal to U1 ***vary directly with converter output voltage as well as with LED current***, the circuit acts to ***approximately regulate the converter's output power***."

(Bowman '283 at col. 5, lines 37-49.)

Thus, Bowman '283 does not maintain a constant LED current as such, but rather ***combines*** the LED feedback current with a value proportional to the converter output ***voltage*** for the purpose of attempting to approximately regulate the converter's output ***power***. The net result is that as the LED forward voltage varies, the voltage drop across resistors R6 and R4 will also vary, leading to ***variation in the LED current***. Bowman '283 explains the relationship of LED voltage to LED current in his system as follows:

> "If, for example, the 3 LEDs used have unusually high forward voltage drop, the feedback action will result in a LED current lower than usual.

Conversely, a unit with unusually low LED forward voltage will provide a higher LED current to compensate."

(Bowman '283 at col. 5, lines 49-53.) Thus, if the LED voltage varies, so too will the LED current in Bowman's system. This is not a "***constant direct current***" as claimed.

It is important to note that LED forward voltage changes dramatically with temperature. Also, LED temperature rises sharply in the first few minutes of operation, and thus the LED forward voltage drops in tandem. Consequently, Bowman's device, based on the circuitry of Figures 1 and 2, will steadily increase the current through the LED's while the LED's heat up during the first few minutes of operation. In other words, Bowman's first mode of operation does not provide "a constant direct current" that is "continuously supplied at a fixed level to said at least one light emitting diode as said battery discharges ***regardless of voltage fluctuations across said at least one light emitting diode***," as required by claim 6. The highlighted language has been added to claim 6 by the amendments herein to clarify this point.

The difference in operation between Bowman's device and the invention of claim 6 can be significant. The inventors of the instant application have discovered that current is the most important factor in determining LED brightness, and that a true constant current is most suitable for lighting for film and television. While it may be acceptable for Bowman's LED-based flashlight to fluctuate in light intensity during initial operation, due to fluctuations in LED current, it could be very problematic for film and television lighting needs which are very demanding. For

example, it would be unacceptable for film or television lighting to fluctuate (either dimming or brightening) during a live shoot, as it could ruin the scene. The inventors therefore have designed their system to provide true constant current, rather than approximating constant power as is done in Bowman '283.

Accordingly, it is respectfully submitted that Bowman '283 does not anticipate claim 6. Additionally, by focusing on constant power and allowing current to fluctuate with forward LED voltage, Bowman '283 in fact ***teaches away*** from the subject matter of claim 6, and would not render it obvious. Claim 6 should thus be allowable over Bowman '283.

c. Claims 10 and 31

Claim 10 pertains to an LED lighting apparatus having "a light emitting diode for providing a continuous source of primary illumination for a subject in film, video, or digital imaging;" and a "switch-mode regulator circuit" having "an input," "a first output ... in communication with said light emitting diode," and "a feedback path in communication with said output such that when said input receives a first voltage, said first output provides a constant current output at a fixed level to said light emitting diode regardless of voltage fluctuations across said light emitting diode."

Without acquiescence in the grounds of rejection, and without prejudice to pursue at a later time by continuation application or otherwise, claim 10 has been amended to incorporate the subject matter of claim 15 and thus specify that the "constant output" is more specifically a "constant current." Consequently, claim 15 has been canceled, as has claim 24 which is no longer pertinent in view of amendments to claims 10 and 22 (from which it depends).

Claim 10 has further been amended to clarify that the switch-mode regulator circuit provides "a constant current output at a fixed level to said light emitting diode regardless of voltage fluctuations across said light emitting diode." As noted above with respect to claim 6, Bowman '283 actually allows the current to fluctuate when the forward LED voltage fluctuates, leading to a different operation. It is respectfully submitted that Bowman '283 does not provide a "constant current at a fixed level ... regardless of voltage fluctuations across said light emitting diode" as recited by claim 10, and that claim 10 should thus be allowable.

Claim 31, as amended, relates to a battery-powered lighting apparatus suitable to provide proper illumination for lighting of a subject in film, video, or digital imaging, comprising a "plurality of light emitting diodes for illuminating a subject to be filmed or imaged," and "a switch-mode regulator circuit configured to receive a first input voltage derived from a battery, and having a first output in communication with said light emitting diodes to provide a continuous current output to the light emitting diodes at a predefined level regardless of voltage fluctuations across said light emitting diodes, wherein said switch-mode regulator further includes a feedback path to sense said first output and regulate said current output to maintain it at said predefined level."

Again, for reasons explained with respect to claim 6, Bowman '283 does not provide a "current output to the light emitting diodes at a predefined level regardless of voltage fluctuations across said light emitting diodes," and it is therefore respectfully submitted that claim 31 should be allowable over Bowman '283.

2. The Dependent Claims (2-5, 7-9, 11-14, 16-23, 25-30, 32-40)

As noted above, claims 2-5, 7-9, 11-30 and 32-40 presently stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Bowman '283 in view of U.S. Patents 5,661,645 (Hochstein) and 6,305,818 (Lebens et al.). Claims 15 and 24 have been canceled in view of incorporation of "constant current" into claims 10 and 22, respectively. Claims 14, 16 and 23 have also been canceled in view of the amendments to claim 10. With respect to the remaining dependent claims, this rejection is respectfully traversed.

First, all of the dependent claims 2-5, 7-9, 11-13, 17-22, 25-30, and 32-40 depend from either claim 1, 6, 10 or 31, and should there be allowable as depending from an allowable base claim.

Further, the dependent claims are believed to contain novel and unique features rendering them independently patentable over the cited items. Given the substantial differences over Bowman '283 already discussed, only a few non-limiting examples are discussed below.

For example, claim 19 depends from claim 10, and recites that the first (input) voltage "comprises, or is derived from, an AC voltage." Claim 28 contains similar recitals. Bowman '283 is intended for a flashlight that does not use – and presumably is incompatible with – an AC input voltage. Accordingly, it is respectfully submitted that one of ordinary skill in the art would not consider modifying Bowman '283 to utilize "an AC voltage" as the first voltage, and that claims 19 and 28 are therefore allowable over the cited items.

Claim 27 recites that the switch-mode regulator comprises "a buck/boost regulator" wherein "over a first portion of a discharge cycle of said battery, said second voltage is greater than a constant voltage output level such that said switch-mode regulator operates in a buck mode and over a second portion of said discharge cycle of said battery, said second voltage is less than said constant voltage output level such that said switch-mode regulator operated in a boost mode." By contrast, Bowman's preferred embodiment uses a boost regulator, and is designed to utilize a relatively low voltage battery (e.g., 3 volts); thus, it is respectfully submitted, one skilled in the art would not be inclined to modify Bowman '283 to use a "buck/boost regulator" as recited in claim 27.

Claim 33 depends indirectly from claim 31, and recites that the battery-powered lighting apparatus further comprises a "ballast element in series with each group [of light emitting diodes and] ... having a value such that a level of direct current drawn by each group is substantially identical," and claim 36 recites that the ballasting element comprises a "transistor having a fixed operational current established at least in part by a zener diode." It is respectfully submitted that this particular combination of circuitry is nowhere disclosed or suggested in the cited items, nor does the Office Action so specify.

New Claims

New dependent claims 41 and 42 have been added, depending from claims 6 and 31, respectively.

New claim 41 recites that the device operates such that "when the battery output voltage is no longer sufficient to supply the constant direct current to the at least light emitting diode at said fixed level, the power supply cuts off the current to the at least one light emitting diode. " Claim 42 is generally similar. By contrast, the device of Bowman '283 has two operating modes, and when the battery voltage drops to a certain level allows the LED current to fluctuate according to the needs of the battery. Such operation is not desirable for a lighting fixture to be used in applications such as motion pictures and television. This is because the illumination level of the device would begin to vary, thus potentially ruining filmed scenes for which the lighting device is being used. Because the light variations may be subtle, they may not be realized until it is too late, well after the scenes have been shot.

The features of claims 41 and 42 mitigate the possibility of light fluctuations by cutting off the LED current when the battery output voltage (or first input voltage) is no longer sufficient to supply the constant current. In this way, if the lighting device is no longer able to supply the required light output, that fact will be immediately recognized and the battery can be swapped out for a new one or else a substitute fixture can be used, thus avoiding the possibility of a ruined motion picture or television shoot. It is respectfully submitted that this substantial benefit is not taught by Bowman '283 or the other cited items, and that claims 41 and 42 should therefore be allowable thereover.

Reservation of Right to Challenge Cited Items

While Applicants have addressed the cited items on the merits, this should not be construed as an admission that they constitute prior art as against the claimed invention. Applicants reserve the right to antedate the cited items pursuant to the appropriate rules, laws, and regulations if deemed necessary to do so.

Likewise, Applicants' election to address the cited items on the merits should not be construed as an admission that they provide an enabling disclosure. Applicants reserve the right to challenge the sufficiency of the cited items at a later point in time, including in any post-issuance proceeding or suit, if appropriate.

Supplemental Information Disclosure Statement

A supplemental Information Disclosure Statement was submitted on September 28, 2007, citing two new references. Applicants kindly request that the Examiner consider the information cited therein in connection with the instant application.

Request for Allowance

The Examiner is kindly requested to enter the amendments presented herein. The undersigned has made a good faith effort to respond to all of the rejections in the case and to place the claims in condition for immediate allowance. Nevertheless, if any unresolved issue remains, the Examiner is invited to contact the undersigned by telephone to discuss those issues so that the Notice of Allowance can be mailed at the earliest possible date.

It is believed that the instant application is in condition for final allowance, and, accordingly, issuance of a Notice of Allowance is earnestly solicited.

Respectfully submitted,

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